Research Article

Comparative evaluation of music therapy in relieving anxiety in patients undergoing surgery

Anita Sharma, Kartik Syal, Jyoti Pathania, Surinder Singh

Department of Anaesthesiology, I. G. Medical College, Shimla, Himachal Pradesh, India

Correspondence to: Anita Sharma, E-mail: anitasharma677@gmail.com

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ABSTRACT

Background: Surgery and anesthesia provoke anxiety in almost all the patients, causing increased sympathetic activity, leading to an increase in the heart rate (HR) and blood pressure. There is an increasing interest in evaluating the use of non-pharmacologic interventions to relieve anxiety in such patients, of which music is the easiest intervention. **Objectives:** This study was conducted to evaluate the effects of pre-operative music intervention on changes in mean arterial pressure (MAP), HR, anxiety, and serum catecholamine levels in patients undergoing surgery. **Materials and Methods:** A total of 100 patients were included, of which 50 each were assigned to the music intervention group and the control group. Serum catecholamine levels were assessed in 10 patients from each group due to the high cost of the test. Patients in the intervention group listened to music during the pre-operative period which was continued until the patient was rolled into operation theater. Patients in the control group received standard care. Data were collected preoperatively at time 1 (T1) in the pre-surgical area and at time 2 before induction in the operation theater and analyzed statistically. **Results:** There was a statistically significant decrease in the HR, MAP, and anxiety score (two-tailed significance 0.00), in the intervention group as compared to those in the control group. In addition, there was statistically significant decrease in the serum epinephrine levels (two-tailed significance 0.039), but norepinephrine levels were not declined significantly in the control group. **Conclusion:** Music is a non-invasive and low-cost intervention that can be easily implemented in the pre-operative setting, and the findings suggest that pre-operative music can reduce HR, MAP, and anxiety.

KEY WORDS: Anxiety; Blood Pressure; Music Therapy; Pre-operative Care

INTRODUCTION

Patients undergoing surgery almost always feel significant anxiety. Anxiety leads to the activation of the sympathetic nervous system which is manifested in the form of changes in the respiratory rate, heart rate (HR), and blood pressure (BP).[1-4] Anxiety in the pre-operative period may cause an elevation in the level of endogenous catecholamines, cortisol, and natural killer lymphocytes, which may lead to delayed wound healing and recovery.[5] Many studies have shown that anxiety before the surgical procedure requires more anesthetic dosages.[5] Various antianxiety drugs are being used to alleviate surgical anxiety, but their dose has to be kept low to avoid untoward side effects such as respiratory depression and excessive sleepiness. Therefore, these days non-pharmacological interventions such as music therapy, which is also called as "Music Medicine," are being focussed upon in addition to drugs for better anxiety allaying effects. "Music medicine" involves passive listening to the pre-recorded music which is offered by medical personnel. It has been used in cognitive treatments and has been found very effective in modifying the psychological status.[6,7] Various studies have been performed using music as part of the treatment modality mainly done in cardiology, neurology,

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geriatrics, oncology, autism, depression, immunology, and anxiety but only a few in pre-operative settings.[6] We planned this study to assess the impact of music in relieving patient's anxiety preoperatively.

MATERIALS AND METHODS

The aim of the present study was to evaluate the effects of music on pre-operative anxiety and physiological parameters including HR, mean arterial pressure (MAP), and serum catecholamine levels. A total of 100 patients undergoing various surgical procedures such as cholecystectomy, gynecological procedures, ureterolithotomy, and hernia of the American Society of Anesthesiologists (ASA) physical status I and II and of age between 20 and 50 years were included in the study after obtaining written consent from patients and approval from the ethical committee of the institution. Patients with mental disorders (e.g., bipolar disorder, schizophrenia, or cognitive impairment) and ear diseases were excluded from the study.

Patients were randomly allocated into two groups: MT and non-MT (NMT) groups. MT group patients were assigned to the music intervention preoperatively, and NMT group patients were kept as controls. Patients in the MT group listened to pre-recorded, familiar, soft music using headphones during the pre-operative period for a minimum period of 20 min. All patients were given 0.25 mg alprazolam on the night before surgery and in the morning at 7.00 AM on the day of surgery. After signing the consent form, patients were told in detail about the objective of the study. Necessary information was provided concerning the examination related to anxiety. Anxiety was measured using visual analog scale for anxiety. Respondents were asked "How much anxiety are you experiencing right now?" Responses indicated the intensity of feeling on a scale of 1–4 [Table 1].

Music preferred in this study was patient selected. Mainly three types of music were selected, i.e., spiritual music, folk music, and popular Hindi music. Patients were taken to operating room while listening to the music. NMT group patients received standard care without music intervention. Data including MAP, HR, and anxiety grade were recorded at time 1 (T1) in the presurgical area (baseline values) before providing MT and at T2 before induction in the operation theater with music on. Blood samples in both the groups were taken just after T2 measurements to assess serum catecholamine levels. Plasma levels of norepinephrine (NE) and epinephrine (E) were measured by enzymatic assay. Demographic data collected to assess any variations in the group included age, gender, and medications such as beta blockers were taken before surgery.

Statistics

Both the demographic data and the clinical data were studied statistically. The data for HR, MAP, and anxiety grade were compared using two-tailed *t*-test.

RESULTS

All patients enrolled in the study completed the study successfully. There was no statistically significant difference in both the groups with regard to demographic data. No patient enrolled in the study was on beta-blocker therapy. The baseline values of HR, MAP, and anxiety grade were comparable in both the groups at T1. Our study showed a significant reduction in anxiety levels in patients who received MT than control group (t = 0.00). There was a significant decrease in MAP and HR in the MT group compared to NMT group after music intervention (t = 0.00) [Table 2]. Serum catecholamine levels were studied in few patients selected randomly, i.e., 10 patients from each group due to the high cost of the investigation. There was a significant reduction in the level of serum E levels with significance (t = 0.039), whereas no significant difference was found in the serum NE levels (t = 0.82) [Table 3].

DISCUSSION

Music has been used as a therapeutic approach in various neurological and psychological disorders and is sometimes to be as efficacious as low-dose antianxiety medications.[8,9] Music is associated with the activation of mesocorticolimbic system such as nucleus accumbens and anterior cingulate gyrus which is critical to reward and reinforcement.[10] Music also has a positive effect in brain structures known to regulate autonomic, emotional, and cognitive functions.[11] It can decrease the anxiety-associated adrenergic response of the body leading to a decrease in the surge of catecholamines.

Table 1: Grading of anxiety

Patient's response	Grading of scale
Not at all	1
Somewhat	2
Moderately so	3
Very much so	4

Table 2: HR, MAP, and anxiety grade of patients at T1 and T2

Parameters	MT	NMT	*t*-test (significance two-tailed)
HRT1	85.28±8.432	84.20±8.064	0.514
HRT2	79.42±7.262	90.48±7.6080	0.000
MAPT1	84.70±8.428	83.00±6.468	0.261
MAPT2	80.20±7.557	89.22±8.476	0.000
Anxiety grade T1	2.88±0.627	2.74±487	0.216
Anxiety grade T2	1.76±0.59	2.92±52	0.000

MT: Music therapy group, NMT: Non-music therapy group, MAP: Mean arterial pressure, T1: Time 1, T2: Time 2, HR: Heart rate

Table 3: Serum catecholamine levels in 10 patients each of MT and NMT groups

Serum catecholamine levels (pg/ml)	MT 10 patients	NMT 10 patients	*t*-test (significance two-tailed)
ET2	30.30±2.359	32.90±2.846	0.039
NE T2	185.90±17.08	187.50±15.204	0.82

MT: Music therapy group, NMT: Non-music therapy group, E: Epinephrine, NE: Norepinephrine

In this study, patients who were given MT in the pre-operative period were found to have a significantly lower anxiety levels before anesthetic induction compared to the control group with significance ($t = 0.00$). Hemodynamic parameters (HR and MAP) of the patients in the study group recorded in the pre-operative period before MT and in the pre-induction period after MT remained stable as compared to the control group, and the difference of which was found to be statistically significant ($t = 0.00$). A significant decrease ($t = 0.039$) was found in the serum E levels after music intervention supporting the role of music in decreasing adrenergic response which corresponds to decrease in the level of anxiety, but NE levels were not decreased significantly ($t = 0.82$).

Various studies in the past have evaluated the effect of MT on anxiety and hemodynamic parameters of the patients undergoing surgery.[2-5,11-15] Lin *et al.* found reduction in the anxiety ($P = 0.018–0.001$) and mean BP ($P = 0.014$) in the group of patients who listened to music which was similar to our study. However, they found less significant difference in NE and E values ($P = 0.619$) after music intervention.[11] Sarkar *et al.*, in their study, on patients undergoing cesarean section under spinal anesthesia found significantly low values of respiratory rate ($P = 0.00$), pulse rate ($P = 0.01$), and anxiety scores ($P = 0.00$) in the MT group as compared to controls but did not found significant difference in systolic and diastolic BP on completion of the surgery.[12] Similar results were found by Pamela *et al.*, wherein they found a significant decline in HR ($P = 0.00$), MAP ($P = 0.00$), and anxiety score (0.00) in the study group in patients undergoing mastectomy.[13] Tse *et al.* also found a significant effect of MT in reducing post-operative pain, HR, systolic BP, and analgesic use following nasal surgery.[14] A study by Ebneshahidi and Mohseni found significantly lower pain scores and post-operative cumulative opioid consumption in the music group, but in comparison to our study, there were no group differences in terms of anxiety score, HR, and BP.[15]

The above mentioned studies have taken only one type of surgical patients and some of them measured pre-operative while others measured peri-operative and post-operative anxiety, whereas our study is conducted on general surgery patients in the pre-operative period only. Music selected in our study was patient preferred familiar one which leads to positive impact in the study as unknown music may not provide relief to the patient anxiety. Clark *et al.* also mentioned the positive effect of preferred music in relieving anxiety.[16] The limitation of the present study is that the serum catecholamine levels were studied in few patients only (10 patients from each group) due to the high cost of the investigation. As the number of patients enrolled was less, the conclusion could not be generalized.

CONCLUSION

Music is a very effective, low cost, nonpharmacological tool to relieve anxiety in patients in the pre-operative period. This study also further supported the role of music in controlling the anxiety in pre-operative period and stabilizing the hemodynamic parameters. Its role in decreasing the sympathetic response by affecting serum catecholamine levels further needs to be studied in future with larger patient population.

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